

SUBSTITUTE SPECIFICATION

**Title of the Invention**

**Electronic Purse Loan System**

*b1>*

**Background of the Invention**

The present invention relates to an electronic purse loan system or POS terminal for storing loan data relating to a shortage in the amount of a payment to a center and for effecting a processing to clear off a loan amount in the next transaction when a commercial transaction is performed using the electronic purse loan system or POS terminal.

If a commercial transaction is performed using a prepaid card of the type which is in widespread use at the present time, such as a telephone card, the above-described system operates to inhibit a commercial transaction involving use of the card at that time when the total consumed amount reaches or exceeds the sum stored in the card.

In addition, an electronic purse system has been developed in which a transaction is performed by recording information concerning the charges for transaction in an IC card, for example; however, in such an electronic purse system, a transaction may be performed only to the extent of the sum payable from an electronic purse, as described in Japanese published unexamined patent application No. H3-92966. That is, if the balance stored in the IC card is

less than the amount of the transaction, the user of the electronic purse is informed that the balance is short and is urged to select whether the transaction is to be stopped, the amount to be paid using the IC card is to be changed or another transaction method, such as a regular credit card, is to be used to perform a flexible transaction.

Since the above-described prepaid card is usable only for payment for a specific service, a card for the amount of money corresponding to the service is prepared beforehand. Therefore, there are few occasions on which the balance is short. However, in the above-described electronic purse system, there is a great possibility that a shortage in the balance will occur at the time of payment due to the user forgetting to pay into his own electronic purse, and the shortage of a required amount to be paid for a transaction occurs because an electronic purse is utilized in many diverse fields. Therefore, in an electronic purse system, the balance in an IC card can be checked at any time using a portable balance display and other means, however, if the balance is short at the time of a transaction, the transaction using the electronic purse is not permitted.

#### Objects of the Invention

The object of the present invention is to provide an electronic purse system in which a transaction is not prevented due to a shortage in the balance held in the IC card even if the user of the electronic purse system forgets to pay into his account for his or her IC card or even

5 during a time of sharing service. Another object of the present invention is to enable correspondence only by the electronic purse system without using another transaction method, such as cash and a credit card, as required heretofore, as a method of avoiding the suspension of a transaction.

10 **Summary of the Invention**

15 To achieve the above-described objects, an electronic purse loan system according to the present invention comprises an IC card provided with a storage for storing an ID number and electronic money information, an IC card reading/writing unit for reading information from the IC card or writing information to the IC card, an input device for inputting a numeric value, an electronic purse terminal provided with a communication control unit for sending or receiving data via a public telephone network, a personal information storage for storing the ID number of the IC card and the information of a loan sum, a correlating device for correlating the ID number of an IC card and the information of the loan sum stored in the personal information storing means, a data bank for storing data, such as a movie, and an information center provided with a communication control unit for sending or receiving data from the data bank via the public telephone network.

20 25 If the balance indicated by the electronic money information of an IC card is less than the amount of a charge when the data stored in the data bank is read, the

processing for a loan is performed by storing the total or a part of the charge in the personal information storing means as information of a loan sum, only if its ID number is verified by correlating the ID number read from the IC card using the correlating device and the user indicates a desire 5 for a loan via the input means.

Therefore, if the shortage in the balance carried by an IC card occurs at the time of payment using the electronic purse system, the processing for a loan can be immediately 10 performed by storing the sum of a loan in the center or a POS terminal as information for a person whose ID number is cataloged, and the suspension of a transaction or the need to change to another transaction method, such as cash and a credit card, can be avoided. Heretofore, if the shortage in 15 the balance carried by an IC card occurred at the time of payment, the transaction was stopped or payment by another transaction method, such as cash and a credit card, was required; however, according to the present invention, the 20 processing for a loan can be immediately performed by the electronic purse system by storing information indicating the sum of a loan in the center or a POS terminal as information for a person whose ID number is cataloged, thereby adding a function for a loan to the electronic purse 25 system, so that suspension of the transaction, or a change to another transaction method, can be avoided and a perfect cashless commercial transaction using only the electronic purse system can be realized.

Brief Description of the Drawings

The features of the present invention will be more apparent from the following detailed description, when taken in conjunction with the accompanying drawings, in which:

5 Fig. 1 is a block diagram showing an embodiment of an electronic purse loan system according to the present invention.

10 Figs. 2(a) and 2(b) are diagrams of examples of a personal information storage in the electronic purse loan system shown in Fig. 1.

15 Fig. 3 is a flowchart showing a concrete example of the basic operation in the electronic purse loan system shown in Fig. 1.

20 Fig. 4 is a flowchart showing another concrete example of the basic operation in the electronic purse loan system shown in Fig. 1.

25 Fig. 5 is a diagram which shows another example of the personal information storage in the electronic purse loan system shown in Fig. 1.

Fig. 6 is a flowchart showing a further example of the basic operation in the electronic purse loan system shown in Fig. 1.

25 Fig. 7 is a block diagram showing a second embodiment of an electronic purse loan system according to the present invention.

Fig. 8 is a flowchart showing example of the basic operation in the electronic purse loan system shown in Fig.

7.

Fig. 9 is a block diagram showing a third embodiment of an electronic purse loan system according to the present invention.

5 Fig. 10 is a diagram which shows a concrete example of a personal information storage in the electronic purse loan system shown in Fig. 9.

10 Fig. 11 is a flowchart showing an example of the basic operation in the electronic purse loan system shown in Fig.

9.

15 Fig. 12 is a flowchart showing the operation at the time of entraining and detraining in the flowchart shown in Fig. 11.

20 Fig. 13 is a block diagram showing another example of an IC card in the electronic purse loan system according to the present invention.

#### Detailed Description of Preferred Embodiments

25 Various embodiments according to the present invention will be described below with reference to the drawings.

Fig. 1 is a block diagram showing a first embodiment of an electronic purse loan system according to the present invention, including an IC card 1, an electronic purse terminal 2, a center 3, a monitor 4, and a setting top box

5. The IC card includes an ID number storage 11, a processor 12, a connection 13, and a sum information storage 14. The electronic purse 2 includes a display 21, an input unit 22, a card controller 23, a card reader/writer 24, a

processor 25, and a communication control unit 26. The center 3 includes a communication control unit 31, a processor 32, a sales storage 33, a personal information storage 34, a data converter 35, a movie bank 36, a news bank 37 and a sports bank 38. The setting top box 5 includes a data converter 51, a setting top box input unit 52, a communication control unit 53 and a processor 54.

Figs. 2(a) and 2(b) represent examples of the personal information storage 34 shown in Fig. 1. A reference number 60 denotes an ID number storage, 61 denotes a loan storage and 62 denotes a loan date storage. The example shown in Fig. 2(a) is for a case where a loan is given one ID number, and the example shown in Fig. 2(b) is for a case where a loan is given a plurality of ID numbers. The latter is for a group, such as a family.

Fig. 3 is a flowchart showing an example of the basic processing carried out by this embodiment.

In this embodiment, service data, such as a movie, news and a sports event is read from the center via a telecommunication line, such as a public telephone network, and the charge for the service is paid using an electronic purse system.

The constitution and the processing shown in Figs. 1 and 3 are based on the premise that the owner of an IC card 1 should pay the charge for a movie by electronic money transfer. The system in this embodiment is placed in a state where it is waiting for the input of an IC card 1 to

be inserted into a slot of the electronic purse terminal 2, and, when that occurs, a message to that effect is displayed on the display 21 of the electronic purse terminal 2 as a result of the processing in a step S102.

5 When the user inserts his/her IC card into the slot of the electronic purse terminal 2, the IC card movement is controlled by the card controller 23 of the electronic purse terminal 2, so that the connection 13 of the IC card 1 is connected to the card reader/writer 24 of the electronic purse terminal 2, and the electronic purse terminal 2 verifies that an IC card 1 has been inserted, in a step 10 S103.

15 When it is verified that an IC card 1 has been inserted, it is first checked to determine whether the owner of the IC card 1 is a cataloged member of the center 3. For that purpose, an ID number proper to the IC card, as stored in the ID number storage 11 of the IC card 1, is read by the card reader/writer 24 in the electronic purse terminal 2 in a step S104, and after this data is processed in the 20 processor 25, it is supplied to the processor 32 of the center 3 via the communication control unit 26 of the electronic purse terminal 2 and the communication control unit 31 of the center 3. The cataloged ID numbers are read from the ID number storage 60 shown in Fig. 2(a) in the 25 personal information storage 34 in the center 3 in a step S105, and the ID number stored in the IC card 1 is correlated with the cataloged ID numbers to determine

whether the ID number stored in the IC card 1 is cataloged in the center 3 in a step S106. When it is verified that the ID number stored in the IC card identifies a cataloged member, a function for obtaining a loan is usable; however, if the ID number stored in the IC card does not identify a cataloged member, the function for obtaining a loan cannot be used, and only a normal transaction using electronic money transfer is allowed, and processing proceeds to a step S114.

If the function for obtaining a loan at the center 3 is used to pay the charge for the last service on behalf of the cataloged member, the member cannot receive the next service until the charge for the last service has been cleared off by the member. Therefore, the contents of information for this member as stored in the personal information storage 34 in the center 3 are referred to in a step S107, and it is checked to determine whether a loan exists in connection with the last transaction in a step S108. As a result, if no loan exists, processing proceeds to the step S114 for a normal procedure for payment.

If it is verified in the step S108 that a loan still exists, the sum of the current loan is displayed on the display 21 of the electronic purse terminal 2, a message which urges the member to select whether the loan is to be cleared off is also displayed, and the owner of the IC card 1 selects either choice via the input unit 22 of the electronic purse terminal 2 in a step S109. If clearing of

the loan is selected, the balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 23 in the electronic purse terminal 2 in a step S110 and is compared with the loan amount stored in the loan amount storage 61 shown in Fig. 2 in the personal information storage 34 in the center 3 by the processor 32 in a step S111.

If the balance carried by the IC card is more than the loan amount, the loan amount is subtracted from the balance by the processor 32 and a new balance is written into the sum information storage 14 of the IC card 1 by the card reader/writer 24 in a step S112. The loan amount storage 61 and the loan date storage 62, respectively, shown in Fig. 2(a) in the personal information storage 34 in the center 3 are updated in a step S113.

Clearing off of the loan undertaken in the last transaction is completed by the above-described steps and processing proceeds to the procedure for the next service. If the loan is not cleared off in the step S109, or if the balance is indicated as being short in the step S111, the next service cannot be received, the IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in a step S129 and the processing is ended in a step S130.

If it is found that the owner of the IC card is not a cataloged member in the step S106, or that no loan exists in the step S108 even if the owner is a cataloged member, when

processing proceeds as far as the above-described step S113, first the identification of a variety of services, such as a movie, news and a sports event, which this system can provide are displayed on the monitor 4 and the user can 5 select his/her desired service on the input unit 52 of the setting top box 5. For example, when a movie is selected, the titles of movies and the charge therefor are displayed in a step S114, and the user selects the title of his/her desired movie on the input unit 52 in a step S115.

10 When a title has been selected, the balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 24 and is compared with the charge for this selected movie by the processor 32 of the center 3 in a step S116. As a result, if the balance is more than or equal to the charge, the charge is subtracted from the balance by the processor 32 in a step S117, the amount is added to the sales storage 33 in a step S118, the balance stored in the sum information storage 14 of the IC card 1 is updated by the card reader/writer 24 and the payment for the 15 charge is completed in a step S119.

20 Then, the data for the movie selected from the movie bank 36 is read and converted by the data converter 35, and the video is sent to the processor 32 of the center 3 and is transferred to the setting top box 5 via the communication control unit 31. The data is fetched in the setting top box 25 5 via the communication control unit 53, movie data is converted by the data converter 51 in a step S125 and the

movie is presented on the monitor 4 in a step S126.

If the balance is found to be less than the charge for the selected movie in the step S116, a message showing that the balance carried by the IC card is short is displayed on the display 21 of the electronic purse terminal 2 in a step 5 S120. And, it is checked again to determine whether the ID number of the user of the IC card 1 is cataloged or not in a step S121; and, as a result, when it is verified that the user is a cataloged member, a message which urges the user 10 to select whether he/she would like to have a loan is displayed on the display 21 and the user is urged to select either choice in a step S122.

If the user indicates a desire to have a loan on the electronic purse input unit 22 in the step S122, the charge is added to the sales storage 33 in the center 3 in a step 15 S123, the amount of the loan is stored in the loan amount storage 61 shown in Fig. 2 and the loan date is stored in the loan date storage 62 shown in Fig. 2(a), respectively, in the personal information storage 34 in a step S124. In 20 this case, the total charge is processed as the amount of the loan. Payment is effected by this procedure and the presentation of the desired movie is started in steps S125 and S126.

If the user is found to be not a cataloged member in 25 the step S121, or if the user elects not to have a loan on the electronic purse input unit 22 in the step S122, even if he/she is a cataloged member, the user cannot receive the

selected movie and his/her IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in a step S129.

When the movie is finished, a message which urges the user to indicate whether the service is to be terminated or another movie is to be selected is displayed on the monitor 4 in a step S127. When the user selects another movie on the input unit 52 of the setting top box 5, processing is returned to a state in which the titles of the movies and the charge therefor are displayed on the monitor 4 in the step S114, and if the user pays the charge, he/she can enjoy another movie.

When the user elects to end the service on the setting top box input unit 52 in the step S127, the service is terminated in a step S128 and his/her IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in the step S129.

An IC card 1 may be provided with a loan sum storage to correlate the data of a loan amount read from each IC card by the card reader/writer 24 with the data stored in the center 3. The total charge may be loaned or the amount in which the balance is short may be loaned. In the latter case, the balance stored in the sum information storage 14 of an IC card 1 is required to be updated.

In the above-described embodiment, in case a plurality of ID numbers in a family are grouped in the personal information storage 34, as shown in Fig. 2(b), and are

stored in the center 3 as group information, a member of the group can clear off the loan given to another member.

Therefore, the charge for the movies enjoyed by a child can be paid for by his/her parent in a lump sum.

5 In the above-described embodiment, the electronic purse terminal 2 and the setting top box 5 are separate, however, the electronic purse system may be built into the setting top box.

10 Next, the processing in this embodiment for a case wherein the term for repayment is determined will be described. Fig. 4 is a flowchart showing the basic processing for payment in accordance with this embodiment in which the term for repayment is determined for a loan.

15 As shown in Figs. 1 and 4, when an IC card 1 is inserted into the slot of an electronic purse terminal 2, which is in the state of waiting for an input in steps S202 and S203 if the owner of the IC card 1 pays the charge for a service by electronic money transfer, the IC card 1 is inserted by the card controller 23 in the electronic purse terminal 2 and the connection 13 provides for connection of the IC card 1 to the card reader/writer 24.

20 The electronic purse terminal 2 verifies that the IC card 1 has been inserted in the step S203 and first checks to determine whether the owner of this IC card 1 is a cataloged member of the center 3.

25 That is, the ID number proper to this IC card, as stored in the ID number storage 11 of the IC card 1, is read

by the card reader/writer 24 in a step S204, and, after it is processed in a processor 25 in the electronic purse terminal 2, it is supplied to the processor 32 of the center 3 via the communication control unit 26 of the electronic purse terminal 2 and the communication control unit 31 of the center 3. The cataloged ID numbers are read from an ID number storage 60 shown in Fig. 2(a) in a personal information storage 34 in the center 3 in a step S205, and it is checked to determine whether the ID number is cataloged in the center 3 by correlating the ID number read from the IC card 1 with the cataloged ID numbers from the personal information storage 34 in a step S206. If the ID number is cataloged in the center 3, a loan is permissible, however, if it is not a cataloged member, a loan cannot be obtained, and only a normal transaction is enabled and processing proceeds to a step S214.

If the charge for the last service is paid utilizing a loan from the center 3 when the ID number is found to belong to a cataloged member, clearing of a prior loan is required; however, in this embodiment, if the date of the transaction is within the period prior to the date that the loan is to be repaid, a further loan can be given, even if the above-described prior loan is not cleared off.

In a step S207, the user's former transactions are checked referring to the contents of a loan date storage 62 shown in Fig. 2 in the personal information storage 34 in the center 3, and, as a result, if the user has no existing

00000000000000000000000000000000

loan in a step S208, processing proceeds to the step S214 for a normal procedure.

If it is determined that the user has an existing loan relating to the last charge in the step S208, the sum of the former loan is displayed on the display 21 of the electronic purse terminal 2 and the user is urged to select whether he/she intends to clear off the loan in a step S209. If the balance stored in the sum information storage 14 of the IC card 1 is more than the loan, the loan can be cleared off; however, if the balance is short or if clearing is not required, the user can refuse to pay off the loan. In this case, processing proceeds to the step S214.

If clearing of the loan is selected in the step S209, the balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 24 of the electronic purse terminal 2 in a step S210 and is compared with the sum of the loan stored in the loan amount storage 61 shown in Fig. 2(a) in the personal information storage 34 in the center 3 by the processor 32 in a step S211. If the balance carried by the IC card is more than the amount of the loan, the loan amount is subtracted from the balance by the processor 32, a new balance is written into the sum information storage 14 of the IC card 1 by the card reader/writer 24 of the electronic purse terminal 2 in the step S212 and the amount of the loan stored in the loan amount storage 61 shown in Fig. 2 and the loan date stored in the loan date storage 62 shown in Fig. 2(a),

respectively, in the personal information storage 34 in the center 3 are reset in the step S213.

Clearing of the former transaction is completed by the above-described steps and processing proceeds to a procedure for the current service. If the former loan is not cleared off in the step S209 or if the balance is short in the step S211, a new service still may be provided without clearing off the loan.

In this regard, the contents of services and the charge are displayed on the monitor 4 in the step S214 and the user selects his/her desired service on the input unit 52 of the setting top box 5 in a step S215.

When a service has been selected, as described above, the balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 24 and sent to the processor 32 of the center 3 where the balance is compared with the charge for the service in a step S216. As a result, if the balance is more than the charge, the charge is subtracted from the balance by the processor 32 in a step S217 and is added to the sales storage 33 by the processor 32 in a step S218. The balance stored in the sum information storage 14 of the IC card 1 is updated by the card reader/writer 24 of the electronic purse terminal 2 in a step S219.

Hereby, payment is completed, the data is transferred to the setting top box 5 in a step S228 and service is started in a step S229.

If the balance is determined to be less than the charge in the step S216, the shortfall is displayed on the display 21 of the electronic purse terminal 2 in a step S220. The ID number is referred to again and it is checked to 5 determine whether the number is assigned to a cataloged member in a step S221. As a result, if the ID number is assigned to a cataloged member, a message which urges the user to select whether the user would like to take out a loan is displayed on the display 21 of the electronic purse 10 terminal 2 in a step S222.

If the user indicates the desire for a loan on the input unit 22 of the electronic purse terminal 2 in a step S222, data stored in the loan date storage 62 shown in Fig. 2 in the personal information storage 34 in the center 3 is read to check whether the user has an existing loan in a step S223, and if the user has no loan at present, processing proceeds to a step S225 so as to give the user a loan immediately.

If the user is given a loan in the step S223 and the date is within the term of repayment set by the center 3, 20 for example the 28th of every month in a step S224, the charge is added to the sales storage 33 by the processor 32 of the center 3 in a step S225, and the loan amount storage 61 and the loan date storage 62, shown in Fig. 2(a), in the personal information storage 34 are updated in a step S226. 25

Payment by loan is completed by this procedure, processing proceeds to the step S228 and service is started

in the step S228.

In this case, the total charge may be loaned or only the shortfall may be loaned.

If the term for repayment is over, a message informing the user that the term for repayment is over is displayed on the display 21 of the electronic purse terminal 2 in a step S227, and the user cannot receive service as a non-cataloged member or a user who selects that he/she has no current loan on the input unit 22 of the electronic purse terminal 2, with a result that the IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in a step S232.

When the service is completed, a message which urges the user to select whether service is to be ended or a new service is to be provided is displayed on the monitor 4 in a step S230. If the user indicates that he/she would like to receive a new service on the input unit 52 of the setting top box 5, processing is returned to the state in which the contents of services and the charge are displayed on the monitor 4 in the step S214, and when payment is made, the user can receive a new service.

If the user indicates that service is to be ended on the input unit 52 of the setting top box 5 in the step S230, service is terminated in the step S231 and the IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in the step S232. Thus, a series of processings is completed in a step S233.

In this embodiment, repayment may be set for payment in monthly installments and charges can be loaned many times within the term for repayment, however, a repayment term storage may be provided in the personal information storage 34 in the center 3, and it may be set so that charges can be loaned many times within the term for repayment set according to the number of days from the day of the first loan.

Next, the processing in this embodiment in the case where the upper limit of a loan is determined will be described.

Fig. 5 shows an example of the personal information storage 34 in Fig. 1 in which the upper limit of a loan is stored. In Fig. 5, a reference number 60 denotes the ID number storage, 71 denotes a loan upper limit storage, 61 denotes the loan amount storage and 62 denotes the loan date storage.

Fig. 6 is a flowchart showing the basic processing when payment is made in accordance with this embodiment provided with a function for giving a loan, the upper limit of which is determined, the upper limit of the loan being stored in the loan upper limit storage 71 in the personal information storage 34 shown in Fig. 5.

In this case, the processing shown in the steps S201 to S213 in Fig. 4 is also used in this embodiment, whereby the loan in the former transaction is cleared off, and after the contents of services and the charge are displayed on the

monitor 4 in a step S301, the user selects his/her desired service on the input unit 52 of the setting top box 5 in a step S302.

When the service is selected, the balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 24 in the electronic purse terminal 2 and sent to the processor 32 of the center 3 to compare the balance with the charge in a step S303. As a result, if the balance is more than the charge, the charge is subtracted from the balance by the processor 32 in a step S304, and the balance stored in the sum information storage 14 of the IC card 1 is updated by the card reader/writer 24 in a step S305. The charge is added to the sales storage 33 by the processor 32 in a step S306.

Thus, payment is completed, the data of the selected service is transferred to the setting top box 5 in a step S315 and service is started in a step S316.

If the balance is determined to be less than the charge in the step S303, a message showing that the balance carried by the IC card is short is displayed on the display 21 of the electronic purse terminal 2 in a step S307. A check is again made to determine whether the user is a cataloged member in a step S308, and, if it is verified that the user is a cataloged member, a message which urges the user to select whether he/she desires a loan is displayed on the display 21 of the electronic purse terminal 2 in a step S309.

If the user indicates that he/she elects to obtain a loan through the input unit 22 of the electronic purse terminal 2, the charge for the service is added to the present sum of the current loan stored in the loan amount storage 61 shown in Fig. 5 in the personal information storage 34 in the center 3 and a new sum for the loan is calculated in a step S310. This new sum for the loan and the upper limit of the loan stored in the loan upper limit storage 71, shown in Fig. 5, in the personal information storage 34 are compared by the processor 32 of the center 3 in a step S311, and, as a result, if the loan is less than the upper limit, the charge for the service is added to the sales storage 33 by the processor 32 in a step S312. The amount of the loan stored in the loan amount storage 61, shown in Fig. 5, in the personal information storage 34 in the center 3 is updated in a step S313.

Payment is completed by the above-described procedure and service is started in the step S315.

If it is determined that the user is not a cataloged member in the step S308, or if the user indicates that he/she does not desire a loan through the input unit 22 in the step S309 even if he/she is a cataloged member, he/she cannot receive service and his/her IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in a step S319.

If the user's loan exceeds the upper limit in the step S311, a message showing that his/her loan exceeds the upper

limit is displayed on the display 21 of the electronic purse terminal 2 in the step S314, and his/her IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in the step S319.

5 When service is completed, a message which urges the user to select whether service is to be terminated or whether a new service is to be provided is displayed on the monitor 4 in the step S317. When the user indicates the desire to receive a new service through the input unit 52 of the setting top box 5, processing is returned to a state in which the contents of services and the charge are displayed on the monitor 4 in the step S301, and when payment has been made, the user can receive the service.

10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525 530 535 540 545 550 555 560 565 570 575 580 585 590 595 600 605 610 615 620 625 630 635 640 645 650 655 660 665 670 675 680 685 690 695 700 705 710 715 720 725 730 735 740 745 750 755 760 765 770 775 780 785 790 795 800 805 810 815 820 825 830 835 840 845 850 855 860 865 870 875 880 885 890 895 900 905 910 915 920 925 930 935 940 945 950 955 960 965 970 975 980 985 990 995 1000 1005 1010 1015 1020 1025 1030 1035 1040 1045 1050 1055 1060 1065 1070 1075 1080 1085 1090 1095 1100 1105 1110 1115 1120 1125 1130 1135 1140 1145 1150 1155 1160 1165 1170 1175 1180 1185 1190 1195 1200 1205 1210 1215 1220 1225 1230 1235 1240 1245 1250 1255 1260 1265 1270 1275 1280 1285 1290 1295 1300 1305 1310 1315 1320 1325 1330 1335 1340 1345 1350 1355 1360 1365 1370 1375 1380 1385 1390 1395 1400 1405 1410 1415 1420 1425 1430 1435 1440 1445 1450 1455 1460 1465 1470 1475 1480 1485 1490 1495 1500 1505 1510 1515 1520 1525 1530 1535 1540 1545 1550 1555 1560 1565 1570 1575 1580 1585 1590 1595 1600 1605 1610 1615 1620 1625 1630 1635 1640 1645 1650 1655 1660 1665 1670 1675 1680 1685 1690 1695 1700 1705 1710 1715 1720 1725 1730 1735 1740 1745 1750 1755 1760 1765 1770 1775 1780 1785 1790 1795 1800 1805 1810 1815 1820 1825 1830 1835 1840 1845 1850 1855 1860 1865 1870 1875 1880 1885 1890 1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070 2075 2080 2085 2090 2095 2100 2105 2110 2115 2120 2125 2130 2135 2140 2145 2150 2155 2160 2165 2170 2175 2180 2185 2190 2195 2200 2205 2210 2215 2220 2225 2230 2235 2240 2245 2250 2255 2260 2265 2270 2275 2280 2285 2290 2295 2300 2305 2310 2315 2320 2325 2330 2335 2340 2345 2350 2355 2360 2365 2370 2375 2380 2385 2390 2395 2400 2405 2410 2415 2420 2425 2430 2435 2440 2445 2450 2455 2460 2465 2470 2475 2480 2485 2490 2495 2500 2505 2510 2515 2520 2525 2530 2535 2540 2545 2550 2555 2560 2565 2570 2575 2580 2585 2590 2595 2600 2605 2610 2615 2620 2625 2630 2635 2640 2645 2650 2655 2660 2665 2670 2675 2680 2685 2690 2695 2700 2705 2710 2715 2720 2725 2730 2735 2740 2745 2750 2755 2760 2765 2770 2775 2780 2785 2790 2795 2800 2805 2810 2815 2820 2825 2830 2835 2840 2845 2850 2855 2860 2865 2870 2875 2880 2885 2890 2895 2900 2905 2910 2915 2920 2925 2930 2935 2940 2945 2950 2955 2960 2965 2970 2975 2980 2985 2990 2995 3000 3005 3010 3015 3020 3025 3030 3035 3040 3045 3050 3055 3060 3065 3070 3075 3080 3085 3090 3095 3100 3105 3110 3115 3120 3125 3130 3135 3140 3145 3150 3155 3160 3165 3170 3175 3180 3185 3190 3195 3200 3205 3210 3215 3220 3225 3230 3235 3240 3245 3250 3255 3260 3265 3270 3275 3280 3285 3290 3295 3300 3305 3310 3315 3320 3325 3330 3335 3340 3345 3350 3355 3360 3365 3370 3375 3380 3385 3390 3395 3400 3405 3410 3415 3420 3425 3430 3435 3440 3445 3450 3455 3460 3465 3470 3475 3480 3485 3490 3495 3500 3505 3510 3515 3520 3525 3530 3535 3540 3545 3550 3555 3560 3565 3570 3575 3580 3585 3590 3595 3600 3605 3610 3615 3620 3625 3630 3635 3640 3645 3650 3655 3660 3665 3670 3675 3680 3685 3690 3695 3700 3705 3710 3715 3720 3725 3730 3735 3740 3745 3750 3755 3760 3765 3770 3775 3780 3785 3790 3795 3800 3805 3810 3815 3820 3825 3830 3835 3840 3845 3850 3855 3860 3865 3870 3875 3880 3885 3890 3895 3900 3905 3910 3915 3920 3925 3930 3935 3940 3945 3950 3955 3960 3965 3970 3975 3980 3985 3990 3995 4000 4005 4010 4015 4020 4025 4030 4035 4040 4045 4050 4055 4060 4065 4070 4075 4080 4085 4090 4095 4100 4105 4110 4115 4120 4125 4130 4135 4140 4145 4150 4155 4160 4165 4170 4175 4180 4185 4190 4195 4200 4205 4210 4215 4220 4225 4230 4235 4240 4245 4250 4255 4260 4265 4270 4275 4280 4285 4290 4295 4300 4305 4310 4315 4320 4325 4330 4335 4340 4345 4350 4355 4360 4365 4370 4375 4380 4385 4390 4395 4400 4405 4410 4415 4420 4425 4430 4435 4440 4445 4450 4455 4460 4465 4470 4475 4480 4485 4490 4495 4500 4505 4510 4515 4520 4525 4530 4535 4540 4545 4550 4555 4560 4565 4570 4575 4580 4585 4590 4595 4600 4605 4610 4615 4620 4625 4630 4635 4640 4645 4650 4655 4660 4665 4670 4675 4680 4685 4690 4695 4700 4705 4710 4715 4720 4725 4730 4735 4740 4745 4750 4755 4760 4765 4770 4775 4780 4785 4790 4795 4800 4805 4810 4815 4820 4825 4830 4835 4840 4845 4850 4855 4860 4865 4870 4875 4880 4885 4890 4895 4900 4905 4910 4915 4920 4925 4930 4935 4940 4945 4950 4955 4960 4965 4970 4975 4980 4985 4990 4995 5000 5005 5010 5015 5020 5025 5030 5035 5040 5045 5050 5055 5060 5065 5070 5075 5080 5085 5090 5095 5100 5105 5110 5115 5120 5125 5130 5135 5140 5145 5150 5155 5160 5165 5170 5175 5180 5185 5190 5195 5200 5205 5210 5215 5220 5225 5230 5235 5240 5245 5250 5255 5260 5265 5270 5275 5280 5285 5290 5295 5300 5305 5310 5315 5320 5325 5330 5335 5340 5345 5350 5355 5360 5365 5370 5375 5380 5385 5390 5395 5400 5405 5410 5415 5420 5425 5430 5435 5440 5445 5450 5455 5460 5465 5470 5475 5480 5485 5490 5495 5500 5505 5510 5515 5520 5525 5530 5535 5540 5545 5550 5555 5560 5565 5570 5575 5580 5585 5590 5595 5600 5605 5610 5615 5620 5625 5630 5635 5640 5645 5650 5655 5660 5665 5670 5675 5680 5685 5690 5695 5700 5705 5710 5715 5720 5725 5730 5735 5740 5745 5750 5755 5760 5765 5770 5775 5780 5785 5790 5795 5800 5805 5810 5815 5820 5825 5830 5835 5840 5845 5850 5855 5860 5865 5870 5875 5880 5885 5890 5895 5900 5905 5910 5915 5920 5925 5930 5935 5940 5945 5950 5955 5960 5965 5970 5975 5980 5985 5990 5995 6000 6005 6010 6015 6020 6025 6030 6035 6040 6045 6050 6055 6060 6065 6070 6075 6080 6085 6090 6095 6100 6105 6110 6115 6120 6125 6130 6135 6140 6145 6150 6155 6160 6165 6170 6175 6180 6185 6190 6195 6200 6205 6210 6215 6220 6225 6230 6235 6240 6245 6250 6255 6260 6265 6270 6275 6280 6285 6290 6295 6300 6305 6310 6315 6320 6325 6330 6335 6340 6345 6350 6355 6360 6365 6370 6375 6380 6385 6390 6395 6400 6405 6410 6415 6420 6425 6430 6435 6440 6445 6450 6455 6460 6465 6470 6475 6480 6485 6490 6495 6500 6505 6510 6515 6520 6525 6530 6535 6540 6545 6550 6555 6560 6565 6570 6575 6580 6585 6590 6595 6600 6605 6610 6615 6620 6625 6630 6635 6640 6645 6650 6655 6660 6665 6670 6675 6680 6685 6690 6695 6700 6705 6710 6715 6720 6725 6730 6735 6740 6745 6750 6755 6760 6765 6770 6775 6780 6785 6790 6795 6800 6805 6810 6815 6820 6825 6830 6835 6840 6845 6850 6855 6860 6865 6870 6875 6880 6885 6890 6895 6900 6905 6910 6915 6920 6925 6930 6935 6940 6945 6950 6955 6960 6965 6970 6975 6980 6985 6990 6995 7000 7005 7010 7015 7020 7025 7030 7035 7040 7045 7050 7055 7060 7065 7070 7075 7080 7085 7090 7095 7100 7105 7110 7115 7120 7125 7130 7135 7140 7145 7150 7155 7160 7165 7170 7175 7180 7185 7190 7195 7200 7205 7210 7215 7220 7225 7230 7235 7240 7245 7250 7255 7260 7265 7270 7275 7280 7285 7290 7295 7300 7305 7310 7315 7320 7325 7330 7335 7340 7345 7350 7355 7360 7365 7370 7375 7380 7385 7390 7395 7400 7405 7410 7415 7420 7425 7430 7435 7440 7445 7450 7455 7460 7465 7470 7475 7480 7485 7490 7495 7500 7505 7510 7515 7520 7525 7530 7535 7540 7545 7550 7555 7560 7565 7570 7575 7580 7585 7590 7595 7600 7605 7610 7615 7620 7625 7630 7635 7640 7645 7650 7655 7660 7665 7670 7675 7680 7685 7690 7695 7700 7705 7710 7715 7720 7725 7730 7735 7740 7745 7750 7755 7760 7765 7770 7775 7780 7785 7790 7795 7800 7805 7810 7815 7820 7825 7830 7835 7840 7845 7850 7855 7860 7865 7870 7875 7880 7885 7890 7895 7900 7905 7910 7915 7920 7925 7930 7935 7940 7945 7950 7955 7960 7965 7970 7975 7980 7985 7990 7995 8000 8005 8010 8015 8020 8025 8030 8035 8040 8045 8050 8055 8060 8065 8070 8075 8080 8085 8090 8095 8100 8105 8110 8115 8120 8125 8130 8135 8140 8145 8150 8155 8160 8165 8170 8175 8180 8185 8190 8195 8200 8205 8210 8215 8220 8225 8230 8235 8240 8245 8250 8255 8260 8265 8270 8275 8280 8285 8290 8295 8300 8305 8310 8315 8320 8325 8330 8335 8340 8345 8350 8355 8360 8365 8370 8375 8380 8385 8390 8395 8400 8405 8410 8415 8420 8425 8430 8435 8440 8445 8450 8455 8460 8465 8470 8475 8480 8485 8490 8495 8500 8505 8510 8515 8520 8525 8530 8535 8540 8545 8550 8555 8560 8565 8570 8575 8580 8585 8590 8595 8600 8605 8610 8615 8620 8625 8630 8635 8640 8645 8650 8655 8660 8665 8670 8675 8680 8685 8690 8695 8700 8705 8710 8715 8720 8725 8730 8735 8740 8745 8750 8755 8760 8765 8770 8775 8780 8785 8790 8795 8800 8805 8810 8815 8820 8825 8830 8835 8840 8845 8850 8855 8860 8865 8870 8875 8880 8885 8890 8895 8900 8905 8910 8915 8920 8925 8930 8935 8940 8945 8950 8955 8960 8965 8970 8975 8980 8985 8990 8995 9000 9005 9010 9015 9020 9025 9030 9035 9040 9045 9050 9055 9060 9065 9070 9075 9080 9085 9090 9095 9100 9105 9110 9115 9120 9125 9130 9135 9140 9145 9150 9155 9160 9165 9170 9175 9180 9185 9190 9195 9200 9205 9210 9215 9220 9225 9230 9235 9240 9245 9250 9255 9260 9265 9270 9275 9280 9285 9290 9295 9300 9305 9310 9315 9320 9325 9330 9335 9340 9345 9350 9355 9360 9365 9370 9375 9380 9385 9390 9395 9400 9405 9410 9415 9420 9425 9430 9435 9440 9445 9450 9455 9460 9465 9470 9475 9480 9485 9490 9495 9500 9505 9510 9515 9520 9525 9530 9535 9540 9545 9550 9555 9560 9565 9570 9575 9580 9585 9590 9595 9600 9605 9610 9615 9620 9625 9630 9635 9640 9645 9650 9655 9660 9665 9670 9675 9680 9685 9690 9695 9700 9705 9710 9715 9720 9725 9730 9735 9740 9745 9750 9755 9760 9765 9770 9775 9780 9785 9790 9795 9800 9805 9810 9815 9820 9825 9830 9835 9840 9845 9850 9855 9860 9865 9870 9875 9880 9885 9890 9895 9900 9905 9910 9915 9920 9925 9930 9935 9940 9945 9950 9955 9960 9965 9970 9975 9980 9985 9990 9995 9999 10000 10005 10010 10015 10020 10025 10030 10035 10040 10045 10050 10055 10060 10065 10070 10075 10080 10085 10090 10095 10099 10100 10101 10102 10103 10104 10105 10106 10107 10108 10109 10110 10111 10112 10113 10114 10115 10116 10117 10118 10119 10120 10121 10122 10123 10124 10125 10126 10127 10128 10129 10130 10131 10132 10133 10134 10135 10136 10137 10138 10139 10140 10141 10142 10143 10144 10145 10146 10147 10148 10149 10150 10151 10152 10153 10154 10155 10156 10157 10158 10159 10160 10161 10162 10163 10164 10165 10166 10167 10168 10169 10170 10171 10172 10173 10174 10175 10176 10177 10178 10179 10180 10181 10182 10183 10184 10185 10186 10187 10188 10189 10190 10191 10192 10193 10194 10195 10196 10197 10198 10199 10200 10201 10202 10203 10204 10205 10206 10207 10208 10209 10210 10211 10212 10213 10214 10215 10216 10217 10218 10219 10220 10221 10222 10223 10224 10225 10226 10227 10228 10229 10230 10231 10232 10233 10234 10235 10236 10237 10238 10239 10240 10241 10242 10243 10244 10245 10246 10247 10248 10249 10250 10251 10252 10253 10254 10255 10256 10257 10258 10259 10260 10261 10262 10263 10264 10265 10266 10267 10268 10269 10270 10271 10272 10273 10274 10275 10276 10277 10278 10279 10280 10281 10282 10283 10284 10285 10286 10287 10288 10289 10290 10291 10292 10293 10294 10295 10296 10297 10298 10299 10299 10300 10300 10300 103

personal information storage 34 in addition to the upper limit loan information to adjust the sum of a loan.

In this embodiment, the total charge is paid by loan, however, if the user does not want to pay the total charge by loan, only the shortfall of the balance may be paid by loan.

The electronic purse loan system, in a case where data from the center, such as a movie, is received via the setting top box has been described above; however, a case where the contents of a game are received via the setting top box may be also considered. In this case, the charge may be required for every game independent of the time, or the charge may be applied for a fixed time period in which games are provided. In the former system, a function for giving a loan can be utilized at the time of clearing, as in the case of a movie. In the latter system, clearing is automatically performed for every fixed time period in which games are provided and only if the balance stored in an IC card is short will a game be temporarily suspended and a function for obtaining a loan be executed.

As described above, even if the balance stored in an IC card is short, when a game is provided based upon payment for a fixed time period of use, the game can be continued owing to the granting of a loan.

Next, an embodiment in case the present invention is used for a POS (point-of-sale) register terminal in a supermarket and other such applications will be described.

Fig. 7 is a block diagram showing a second embodiment of an electronic purse loan system according to the present invention for use as a POS terminal. The POS terminal 8 includes a display 81, a POS register keyboard input unit 82, a card controller 83, a card reader/writer 84, a processor 85, a communication control unit 86, a sales storage 87, and a personal information storage 88. The IC card 1 has the same elements, as in the embodiment shown in Fig. 1.

Fig. 8 is a flowchart showing an example of the basic processing in this embodiment.

When the owner of an IC card 1 inserts the IC card 1 into the slot of the POS terminal 8, which is in a state waiting for an input in steps S402 and S403 to pay the charge for a service or goods by electronic money transfer, it is verified in a step S403 that the IC card 1 has been inserted.

When it is verified that the IC card 1 has been inserted, it is first checked to determine whether the owner of the IC card 1 is a cataloged member eligible for use of the POS terminal 8.

Therefore, the ID number of the IC card, as stored in the ID number storage 11 of the IC card 1, is read by the card reader/writer 84 in the POS terminal 8 in a step S404 and is supplied to the processor 85 of the POS terminal 8. Next, the cataloged ID numbers are read from an ID number storage 60 in the personal information storage 88 (provided

with the same constitution as the personal information storage 34 shown in Fig. 2(a) in this embodiment) in the POS terminal 8 in a step S405, and the ID number read from the IC card is correlated with the stored ID numbers to determine whether the ID number of the IC card is cataloged in the POS terminal 8 in a step S406.

Hereby, if it is verified that the ID number of the IC card is cataloged, payment by the loan system is enabled; however, if the ID number is not cataloged, the owner of the IC card cannot utilize the loan system, and only a normal transaction by electronic money transfer or standard credit card is enabled, and processing proceeds to a step S414.

Unless a cataloged member has paid the charge for the last service in which the loan function of the POS terminal 8 was utilized, he/she cannot receive this service without clearing the existing loan. Therefore, the last transaction is checked in a step S408 by referring to the information stored in a loan amount storage 61 and a loan date storage 62 shown in Fig. 2(a) in the personal information storage 88 in the POS terminal 8 in a step S407. As a result, if the owner has no loan, processing proceeds to a step S414 for normal payment.

If it is verified in the step S408 that the owner has a current loan, the sum of the loan is displayed on the display 81 of the POS terminal 8, a message which urges the owner of the IC card 1 to select whether the loan is to be cleared off is displayed there and he/she selects either

choice on the POS register keyboard input unit 82 in a step 5 S409. If the owner elects to clear the loan, the balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 84 in the POS terminal 8 in a step S410 and is compared with the sum of the loan stored in the loan amount storage 61 in the personal information storage 88 by the processor 85 in a step S411.

10 If the balance carried by the IC card is more than the sum of the loan, the sum of the loan is subtracted from the balance by the processor 85 and a new balance is written into the sum information storage 14 of the IC card 1 by the card reader/writer 84 in a step S412. The loan amount storage 61 and the loan date storage 62 in the personal information storage 88 in the POS terminal 8 are reset in a step S413.

15 Clearing off a loan relating to the last transaction is completed by the above-described procedure and a procedure for providing the current service or goods is started. If a loan is not cleared off in the step S409 or it is found that 20 the balance is short in the step S411, the owner cannot receive service, his/her IC card 1 is ejected from the POS terminal 8 by the card controller 83 in a step S426 and the processing is terminated in a step S427.

25 If it is found that the owner is not a cataloged member in the step S406, or if he/she has no loan even if he/she is a cataloged member, when processing proceeds to the above-described step S413, first the contents of this

service and the charge are displayed on the display 81 of the POS terminal 8 in the step S414. The balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 84 and is compared with the charge for the service or goods by the processor 85 in a step S415. As a result, if the balance carried by the IC card is more than or equal to the charge, the charge is subtracted from the balance by the processor 85 in a step S416, the charge is added to the sales storage 87 in a step S417, the balance stored in the sum information storage 14 of the IC card 1 is updated by the card reader/writer 84 in a step S418, a message showing the completion of payment is displayed on the display 81 of the POS terminal 8 in a step S424 and the payment process is completed in a step S425.

If it is found that the balance stored in the IC card 1 is less than the charge for the service or goods in a step S421, a message showing the balance is short is displayed on the display 81 of the POS terminal 8 in a step S419. It is checked again to determine whether the ID number of the IC card 1 is that of a cataloged member in a step 420. As a result, if the ID number is for a cataloged member, a message which urges the owner to indicate whether he/she desires a loan is displayed on the display 81 in the step S421.

If the owner selects to obtain a loan on the POS register input unit 82 in the step S421, the charge is added to the sales storage 87 in the POS terminal 8 in a step

S422, the sum of the loan is stored in the loan amount storage 61 and the loan date is stored in the loan date storage 62 in the personal information storage 88 in a step S423.

5 The data indicating the sum of a loan may be stored in both the POS terminal 8 and an IC card 1 by providing a loan sum storage in the IC card 1 and storing the sum of a loan in the IC card 1 using the card reader/writer 84. The total charge may be loaned or the shortfall of a balance may be  
10 loaned.

15 A message showing that payment has been completed is displayed on the display 81 of the POS terminal 8 by this procedure in the step S424 and the payment process is ended in the step S425. A non-cataloged member in the step S420, or the user who indicates that he/she wants no loan on the POS register input unit 82 in the step S421, cannot pay the charge for the service or goods and his/her IC card 1 is ejected from the POS terminal 8 by the card controller 83 in the step S426. In this case, the user is required to stop  
20 shopping at the supermarket or to initiate a procedure for payment again after he/she pays the required sum in his/her account for his/her IC card.

25 When the payment for the charge is completed, the IC card 1 is ejected from the POS terminal 8 by the card controller 83 in the step S426.

Electronic money information read from an IC card 1 is supplied to the sales storage 87 in the POS terminal 8,

however, it may be transmitted to a bank and other services via the communication control unit 86.

In this embodiment, the upper limit of a loan and the term of repayment also may be set. This embodiment may be constituted so that a loan and clearing off of a loan are enabled in any POS terminal at the chain stores of a convenience store or a gas station by providing a personal information storage in the center. In such case, personal information, such as the sum of a loan, and electronic money information are transmitted to the center or bank via the communication control unit 86.

Next, an embodiment in a case where the present invention is utilized for an automatic ticket examiner, which is used for payment of the fare for a train or a bus, for example, will be described.

Fig. 9 is a block diagram showing a third embodiment of an electronic purse loan system according to the present invention in a case where the present invention is utilized for an automatic ticket examiner. A reference number 1 denotes an IC card, 9 denotes an automatic ticket examiner for an electronic purse and 10 denotes a center. The automatic ticket examiner for an electronic purse 9 has a display, a station code storage 92, a card controller 93, a card reader/writer 94, a processor 95, a communication control processor 96 and a gate controller 97. The center 10 includes a communication control unit 101, a processor 102, a sales storage 103, a personal information storage 104

and a fare data storage 105.

Fig. 10 shows an example of a personal information storage for the automatic ticket examiner shown in Fig. 9, wherein a reference number 110 denotes the personal information storage for the automatic ticket examiner, 111 denotes an entraining station code storage and the other portions have the same reference number as assigned to a corresponding portion in Fig. 5.

Fig. 11 is a flowchart showing the basic processing in this embodiment.

When the owner of an IC card 1 inserts the IC card 1 into the slot for an IC card in the automatic ticket examiner 9 for an electronic purse, which is in the state of waiting for an input in steps S502 and S503, as shown in Figs. 9 and 11, to pay a fare by electronic money transfer, the connection 13 of the IC card 1 is connected to the card reader/writer 94 by the card controller 93 in a step S503.

When the IC card 1 is inserted, the ID number is first read from the IC card 1 to determine whether the user is entraining or detraining. That is, after the ID number of this IC card 1, as stored in the ID number storage 13 of the IC card 1, is read by the card reader/writer 94 and is processed by the processor 95, it is supplied to the processor 102 of the center 10 via the communication control units 96 and 101 in a step S504. The ID numbers cataloged in an ID number storage 60 shown in Fig. 10 in the personal information storage 104 in the center 10, if any, are read

in a step S505, and the ID number read from the IC card 1 is compared with these ID numbers in a step S506.

As a result, if the ID number of the IC card 1 is not cataloged, the owner of this IC card 1 is identified as an incoming passenger, and so processing proceeds in step S506 to an entraining process flowchart shown in Fig. 12(a); and, if the ID number of this IC card 1 is cataloged, the owner of this IC card 1 is identified as an outgoing passenger or a passenger who may already have a current loan. Further, to judge whether a user whose ID number is cataloged is detraining or is an entraining passenger that has a loan, the information stored in a loan amount storage 61 shown in Fig. 10 in the personal information storage 104 in the center 10 is read in a step S507, and it is judged from this information in a step S508 whether the user has a loan. If the user has a loan, the processing for clearing the loan is performed, and since the user is an ongoing passenger, processing proceeds to the entraining flowchart shown in Fig. 12(a).

If the user has a loan, the current balance is read from the sum information storage 14 of the IC card 1 by the card reader/writer 94 to clear off the loan automatically and is supplied to the processor 102 of the center 10 via the communication control processors 96 and 101 in a step S509. In this regard, the sum of the loan stored in the loan storage 61 shown in Fig. 10 in the personal information storage 104 and the balance are compared in a step S510. If

it is found that the balance is more than or equal to the loan, the sum of the loan is subtracted from the balance, a new balance is written into the sum information storage 14 of the IC card 1 by the card reader/writer 94 in a step 5 S511, the personal information storage 104 in the center 10 is reset and clearing of the loan is completed in a step S512. If it is found that the balance is less than the loan amount in the step S510, a gate for entrance is shut by the gate controller 97 of the automatic ticket examiner 9 for an electronic purse in a step S513, the IC card 1 is ejected by the card controller 93 in a step S514 and the user is prevented from entering the station in a step S515.

10  
15  
20  
25  
30  
35  
40  
45  
50  
55  
60  
65  
70  
75  
80  
85  
90  
95  
100  
105  
110  
115  
120  
125  
130  
135  
140  
145  
150  
155  
160  
165  
170  
175  
180  
185  
190  
195  
200  
205  
210  
215  
220  
225  
230  
235  
240  
245  
250  
255  
260  
265  
270  
275  
280  
285  
290  
295  
300  
305  
310  
315  
320  
325  
330  
335  
340  
345  
350  
355  
360  
365  
370  
375  
380  
385  
390  
395  
400  
405  
410  
415  
420  
425  
430  
435  
440  
445  
450  
455  
460  
465  
470  
475  
480  
485  
490  
495  
500  
505  
510  
515  
520  
525  
530  
535  
540  
545  
550  
555  
560  
565  
570  
575  
580  
585  
590  
595  
600  
605  
610  
615  
620  
625  
630  
635  
640  
645  
650  
655  
660  
665  
670  
675  
680  
685  
690  
695  
700  
705  
710  
715  
720  
725  
730  
735  
740  
745  
750  
755  
760  
765  
770  
775  
780  
785  
790  
795  
800  
805  
810  
815  
820  
825  
830  
835  
840  
845  
850  
855  
860  
865  
870  
875  
880  
885  
890  
895  
900  
905  
910  
915  
920  
925  
930  
935  
940  
945  
950  
955  
960  
965  
970  
975  
980  
985  
990  
995  
1000  
1005  
1010  
1015  
1020  
1025  
1030  
1035  
1040  
1045  
1050  
1055  
1060  
1065  
1070  
1075  
1080  
1085  
1090  
1095  
1100  
1105  
1110  
1115  
1120  
1125  
1130  
1135  
1140  
1145  
1150  
1155  
1160  
1165  
1170  
1175  
1180  
1185  
1190  
1195  
1200  
1205  
1210  
1215  
1220  
1225  
1230  
1235  
1240  
1245  
1250  
1255  
1260  
1265  
1270  
1275  
1280  
1285  
1290  
1295  
1300  
1305  
1310  
1315  
1320  
1325  
1330  
1335  
1340  
1345  
1350  
1355  
1360  
1365  
1370  
1375  
1380  
1385  
1390  
1395  
1400  
1405  
1410  
1415  
1420  
1425  
1430  
1435  
1440  
1445  
1450  
1455  
1460  
1465  
1470  
1475  
1480  
1485  
1490  
1495  
1500  
1505  
1510  
1515  
1520  
1525  
1530  
1535  
1540  
1545  
1550  
1555  
1560  
1565  
1570  
1575  
1580  
1585  
1590  
1595  
1600  
1605  
1610  
1615  
1620  
1625  
1630  
1635  
1640  
1645  
1650  
1655  
1660  
1665  
1670  
1675  
1680  
1685  
1690  
1695  
1700  
1705  
1710  
1715  
1720  
1725  
1730  
1735  
1740  
1745  
1750  
1755  
1760  
1765  
1770  
1775  
1780  
1785  
1790  
1795  
1800  
1805  
1810  
1815  
1820  
1825  
1830  
1835  
1840  
1845  
1850  
1855  
1860  
1865  
1870  
1875  
1880  
1885  
1890  
1895  
1900  
1905  
1910  
1915  
1920  
1925  
1930  
1935  
1940  
1945  
1950  
1955  
1960  
1965  
1970  
1975  
1980  
1985  
1990  
1995  
2000  
2005  
2010  
2015  
2020  
2025  
2030  
2035  
2040  
2045  
2050  
2055  
2060  
2065  
2070  
2075  
2080  
2085  
2090  
2095  
2100  
2105  
2110  
2115  
2120  
2125  
2130  
2135  
2140  
2145  
2150  
2155  
2160  
2165  
2170  
2175  
2180  
2185  
2190  
2195  
2200  
2205  
2210  
2215  
2220  
2225  
2230  
2235  
2240  
2245  
2250  
2255  
2260  
2265  
2270  
2275  
2280  
2285  
2290  
2295  
2300  
2305  
2310  
2315  
2320  
2325  
2330  
2335  
2340  
2345  
2350  
2355  
2360  
2365  
2370  
2375  
2380  
2385  
2390  
2395  
2400  
2405  
2410  
2415  
2420  
2425  
2430  
2435  
2440  
2445  
2450  
2455  
2460  
2465  
2470  
2475  
2480  
2485  
2490  
2495  
2500  
2505  
2510  
2515  
2520  
2525  
2530  
2535  
2540  
2545  
2550  
2555  
2560  
2565  
2570  
2575  
2580  
2585  
2590  
2595  
2600  
2605  
2610  
2615  
2620  
2625  
2630  
2635  
2640  
2645  
2650  
2655  
2660  
2665  
2670  
2675  
2680  
2685  
2690  
2695  
2700  
2705  
2710  
2715  
2720  
2725  
2730  
2735  
2740  
2745  
2750  
2755  
2760  
2765  
2770  
2775  
2780  
2785  
2790  
2795  
2800  
2805  
2810  
2815  
2820  
2825  
2830  
2835  
2840  
2845  
2850  
2855  
2860  
2865  
2870  
2875  
2880  
2885  
2890  
2895  
2900  
2905  
2910  
2915  
2920  
2925  
2930  
2935  
2940  
2945  
2950  
2955  
2960  
2965  
2970  
2975  
2980  
2985  
2990  
2995  
3000  
3005  
3010  
3015  
3020  
3025  
3030  
3035  
3040  
3045  
3050  
3055  
3060  
3065  
3070  
3075  
3080  
3085  
3090  
3095  
3100  
3105  
3110  
3115  
3120  
3125  
3130  
3135  
3140  
3145  
3150  
3155  
3160  
3165  
3170  
3175  
3180  
3185  
3190  
3195  
3200  
3205  
3210  
3215  
3220  
3225  
3230  
3235  
3240  
3245  
3250  
3255  
3260  
3265  
3270  
3275  
3280  
3285  
3290  
3295  
3300  
3305  
3310  
3315  
3320  
3325  
3330  
3335  
3340  
3345  
3350  
3355  
3360  
3365  
3370  
3375  
3380  
3385  
3390  
3395  
3400  
3405  
3410  
3415  
3420  
3425  
3430  
3435  
3440  
3445  
3450  
3455  
3460  
3465  
3470  
3475  
3480  
3485  
3490  
3495  
3500  
3505  
3510  
3515  
3520  
3525  
3530  
3535  
3540  
3545  
3550  
3555  
3560  
3565  
3570  
3575  
3580  
3585  
3590  
3595  
3600  
3605  
3610  
3615  
3620  
3625  
3630  
3635  
3640  
3645  
3650  
3655  
3660  
3665  
3670  
3675  
3680  
3685  
3690  
3695  
3700  
3705  
3710  
3715  
3720  
3725  
3730  
3735  
3740  
3745  
3750  
3755  
3760  
3765  
3770  
3775  
3780  
3785  
3790  
3795  
3800  
3805  
3810  
3815  
3820  
3825  
3830  
3835  
3840  
3845  
3850  
3855  
3860  
3865  
3870  
3875  
3880  
3885  
3890  
3895  
3900  
3905  
3910  
3915  
3920  
3925  
3930  
3935  
3940  
3945  
3950  
3955  
3960  
3965  
3970  
3975  
3980  
3985  
3990  
3995  
4000  
4005  
4010  
4015  
4020  
4025  
4030  
4035  
4040  
4045  
4050  
4055  
4060  
4065  
4070  
4075  
4080  
4085  
4090  
4095  
4100  
4105  
4110  
4115  
4120  
4125  
4130  
4135  
4140  
4145  
4150  
4155  
4160  
4165  
4170  
4175  
4180  
4185  
4190  
4195  
4200  
4205  
4210  
4215  
4220  
4225  
4230  
4235  
4240  
4245  
4250  
4255  
4260  
4265  
4270  
4275  
4280  
4285  
4290  
4295  
4300  
4305  
4310  
4315  
4320  
4325  
4330  
4335  
4340  
4345  
4350  
4355  
4360  
4365  
4370  
4375  
4380  
4385  
4390  
4395  
4400  
4405  
4410  
4415  
4420  
4425  
4430  
4435  
4440  
4445  
4450  
4455  
4460  
4465  
4470  
4475  
4480  
4485  
4490  
4495  
4500  
4505  
4510  
4515  
4520  
4525  
4530  
4535  
4540  
4545  
4550  
4555  
4560  
4565  
4570  
4575  
4580  
4585  
4590  
4595  
4600  
4605  
4610  
4615  
4620  
4625  
4630  
4635  
4640  
4645  
4650  
4655  
4660  
4665  
4670  
4675  
4680  
4685  
4690  
4695  
4700  
4705  
4710  
4715  
4720  
4725  
4730  
4735  
4740  
4745  
4750  
4755  
4760  
4765  
4770  
4775  
4780  
4785  
4790  
4795  
4800  
4805  
4810  
4815  
4820  
4825  
4830  
4835  
4840  
4845  
4850  
4855  
4860  
4865  
4870  
4875  
4880  
4885  
4890  
4895  
4900  
4905  
4910  
4915  
4920  
4925  
4930  
4935  
4940  
4945  
4950  
4955  
4960  
4965  
4970  
4975  
4980  
4985  
4990  
4995  
5000  
5005  
5010  
5015  
5020  
5025  
5030  
5035  
5040  
5045  
5050  
5055  
5060  
5065  
5070  
5075  
5080  
5085  
5090  
5095  
5100  
5105  
5110  
5115  
5120  
5125  
5130  
5135  
5140  
5145  
5150  
5155  
5160  
5165  
5170  
5175  
5180  
5185  
5190  
5195  
5200  
5205  
5210  
5215  
5220  
5225  
5230  
5235  
5240  
5245  
5250  
5255  
5260  
5265  
5270  
5275  
5280  
5285  
5290  
5295  
5300  
5305  
5310  
5315  
5320  
5325  
5330  
5335  
5340  
5345  
5350  
5355  
5360  
5365  
5370  
5375  
5380  
5385  
5390  
5395  
5400  
5405  
5410  
5415  
5420  
5425  
5430  
5435  
5440  
5445  
5450  
5455  
5460  
5465  
5470  
5475  
5480  
5485  
5490  
5495  
5500  
5505  
5510  
5515  
5520  
5525  
5530  
5535  
5540  
5545  
5550  
5555  
5560  
5565  
5570  
5575  
5580  
5585  
5590  
5595  
5600  
5605  
5610  
5615  
5620  
5625  
5630  
5635  
5640  
5645  
5650  
5655  
5660  
5665  
5670  
5675  
5680  
5685  
5690  
5695  
5700  
5705  
5710  
5715  
5720  
5725  
5730  
5735  
5740  
5745  
5750  
5755  
5760  
5765  
5770  
5775  
5780  
5785  
5790  
5795  
5800  
5805  
5810  
5815  
5820  
5825  
5830  
5835  
5840  
5845  
5850  
5855  
5860  
5865  
5870  
5875  
5880  
5885  
5890  
5895  
5900  
5905  
5910  
5915  
5920  
5925  
5930  
5935  
5940  
5945  
5950  
5955  
5960  
5965  
5970  
5975  
5980  
5985  
5990  
5995  
6000  
6005  
6010  
6015  
6020  
6025  
6030  
6035  
6040  
6045  
6050  
6055  
6060  
6065  
6070  
6075  
6080  
6085  
6090  
6095  
6100  
6105  
6110  
6115  
6120  
6125  
6130  
6135  
6140  
6145  
6150  
6155  
6160  
6165  
6170  
6175  
6180  
6185  
6190  
6195  
6200  
6205  
6210  
6215  
6220  
6225  
6230  
6235  
6240  
6245  
6250  
6255  
6260  
6265  
6270  
6275  
6280  
6285  
6290  
6295  
6300  
6305  
6310  
6315  
6320  
6325  
6330  
6335  
6340  
6345  
6350  
6355  
6360  
6365  
6370  
6375  
6380  
6385  
6390  
6395  
6400  
6405  
6410  
6415  
6420  
6425  
6430  
6435  
6440  
6445  
6450  
6455  
6460  
6465  
6470  
6475  
6480  
6485  
6490  
6495  
6500  
6505  
6510  
6515  
6520  
6525  
6530  
6535  
6540  
6545  
6550  
6555  
6560  
6565  
6570  
6575  
6580  
6585  
6590  
6595  
6600  
6605  
6610  
6615  
6620  
6625  
6630  
6635  
6640  
6645  
6650  
6655  
6660  
6665  
6670  
6675  
6680  
6685  
6690  
6695  
6700  
6705  
6710  
6715  
6720  
6725  
6730  
6735  
6740  
6745  
6750  
6755  
6760  
6765  
6770  
6775  
6780  
6785  
6790  
6795  
6800  
6805  
6810  
6815  
6820  
6825  
6830  
6835  
6840  
6845  
6850  
6855  
6860  
6865  
6870  
6875  
6880  
6885  
6890  
6895  
6900  
6905  
6910  
6915  
6920  
6925  
6930  
6935  
6940  
6945  
6950  
6955  
6960  
6965  
6970  
6975  
6980  
6985  
6990  
6995  
7000  
7005  
7010  
7015  
7020  
7025  
7030  
7035  
7040  
7045  
7050  
7055  
7060  
7065  
7070  
7075  
7080  
7085  
7090  
7095  
7100  
7105  
7110  
7115  
7120  
7125  
7130  
7135  
7140  
7145  
7150  
7155  
7160  
7165  
7170  
7175  
7180  
7185  
7190  
7195  
7200  
7205  
7210  
7215  
7220  
7225  
7230  
7235  
7240  
7245  
7250  
7255  
7260  
7265  
7270  
7275  
7280  
7285  
7290  
7295  
7300  
7305  
7310  
7315  
7320  
7325  
7330  
7335  
7340  
7345  
7350  
7355  
7360  
7365  
7370  
7375  
7380  
7385  
7390  
7395  
7400  
7405  
7410  
7415  
7420  
7425  
7430  
7435  
7440  
7445  
7450  
7455  
7460  
7465  
7470  
7475  
7480  
7485  
7490  
7495  
7500  
7505  
7510  
7515  
7520  
7525  
7530  
7535  
7540  
7545  
7550  
7555  
7560  
7565  
7570  
7575  
7580  
7585  
7590  
7595  
7600  
7605  
7610  
7615  
7620  
7625  
7630  
7635  
7640  
7645  
7650  
7655  
7660  
7665  
7670  
7675  
7680  
7685  
7690  
7695  
7700  
7705  
7710  
7715  
7720  
7725  
7730  
7735  
7740  
7745  
7750  
7755  
7760  
7765  
7770  
7775  
7780  
7785  
7790  
7795  
7800  
7805  
7810  
7815  
7820  
7825  
7830  
7835  
7840  
7845  
7850  
7855  
7860  
7865  
7870  
7875  
7880  
7885  
7890  
7895  
7900  
7905  
7910  
7915  
7920  
7925  
7930  
7935  
7940  
7945  
7950  
7955  
7960  
7965  
7970  
7975  
7980  
7985  
7990  
7995  
8000  
8005  
8010  
8015  
8020  
8025  
8030  
8035  
8040  
8045  
8050  
8055  
8060  
8065  
8070  
8075  
8080  
8085  
8090  
8095  
8100  
8105  
8110  
8115  
8120  
8125  
8130  
8135  
8140  
8145  
8150  
8155  
8160  
8165  
8170  
8175  
8180  
8185  
8190  
8195  
8200  
8205  
8210  
8215  
8220  
8225  
8230  
8235  
8240  
8245  
8250  
8255  
8260  
8265  
8270  
8275  
8280  
8285  
8290  
8295  
8300  
8305  
8310  
8315  
8320  
8325  
8330  
8335  
8340  
8345  
8350  
8355  
8360  
8365  
8370  
8375  
8380  
8385  
8390  
8395  
8400  
8405  
8410  
8415  
8420  
8425  
8430  
8435  
8440  
8445  
8450  
8455  
8460  
8465  
8470  
8475  
8480  
8485  
8490  
8495  
8500  
8505  
8510  
8515  
8520  
8525  
8530  
8535  
8540  
8545  
8550  
8555  
8560  
8565  
8570  
8575  
8580  
8585  
8590  
8595  
8600  
8605  
8610  
8615  
8620  
8625  
8630  
8635  
8640  
8645  
8650  
8655  
8660  
8665  
8670  
8675  
8680  
8685  
8690  
8695  
8700  
8705  
8710  
8715  
8720  
8725  
8730  
8735  
8740  
8745  
8750  
8755  
8760  
8765  
8770  
8775  
8780  
8785  
8790  
8795  
8800  
8805  
8810  
8815  
8820  
8825  
8830  
8835  
8840  
8845  
8850  
8855  
8860  
8865  
8870  
8875  
8880  
8885  
8890  
8895  
8900  
8905  
8910  
8915  
8920  
8925  
8930  
8935  
8940  
8945  
8950  
8955  
8960  
8965  
8970  
8975  
8980  
8985  
8990  
8995  
9000  
9005  
9010  
9015  
9020  
9025  
9030  
9035  
9040  
9045  
9050  
9055  
9060  
9065  
9070  
9075  
9080  
9085  
9090  
9095  
9100  
9105  
9110  
9115  
9120  
9125  
9130  
9135  
9140  
9145  
9150  
9155  
9160  
9165  
9170  
9175  
9180  
9185  
9190  
9195  
9200  
9205  
9210  
9215  
9220  
9225  
9230  
9235  
9240  
9245  
9250  
9255  
9260  
9265  
9270  
9275  
9280  
9285  
9290  
9295  
9300  
9305  
9310  
9315  
9320  
9325  
9330  
9335  
9340  
9345  
9350  
9355  
9360  
9365  
9370  
9375  
9380  
9385  
9390  
9395  
9400  
9405  
9410  
9415  
9420  
9425  
9430  
9435  
9440  
9445  
9450  
9455  
9460  
9465  
9470  
9475

and the processing for entrance is completed in a step S605. However, at this time, no payment is made.

In the case of detrainment, the information stored in the entraining station code storage 111 shown in Fig. 10 in the personal information storage 104 in the center 10 is read in a step S606, as shown in Fig. 12(b), and similarly, the detraining station code is read from the station code storage 92 in the automatic ticket examiner 9 for an electronic purse in a step S607. The charge corresponding to the entrained station is read from fare data stored in the center 10 in a step S608 and the charge is displayed on the display 91 of the automatic ticket examiner 9 for an electronic purse in a step S609.

Data is read from the sum information storage 14 of the IC card 1 by the card reader/writer 94 and is compared with the above-described charge in a step S610. As a result, if the balance is more than the charge, processing proceeds for normal payment, and if the balance is less than the charge, processing proceeds for establishing a loan. In the processing for normal payment, the charge is subtracted from the balance in a step S611, the charge is added to the sales storage 103 in the center 10 in a step S612 and a new balance is written into the sum information storage 14 in a step S613. Thus, payment is completed, the gate is opened by the gate controller 97 in a step S618, the IC card 1 is ejected from the automatic ticket examiner 9 for an electronic purse by the card controller 93 in a step S619

and the processing is ended in a step S620.

If it is found that the balance is short in the step S610, a loan is automatically made. That is, a message showing that the balance is short is displayed on the display 91 of the automatic ticket examiner 9 for an electronic purse in a step S614 and the charge is added to the sales storage 103 in a step S615. In this case, the total charge is loaned. The ID number of the IC card 1 is written into the ID number storage 60 shown in Fig. 10 in the personal information storage 104 in the center 10, the sum of the loan is written into the loan storage 61 shown in Fig. 10 and the loan date is written into the loan date storage 62 shown in Fig. 10 in a step S616. Hereby, the processing for a loan is completed, the gate is opened in a step S617, then the IC card 1 is ejected in a step S618 and the processing is ended in a step S619.

So far a case wherein a loan has been made once is described; however, in this embodiment a loan may be made plural times by setting the upper limit of a loan and the term of repayment, or the times of a loan, in the personal information storage 104. The total charge may be loaned or only the shortfall may be loaned. Further, data exchange between the IC card 1 and the automatic ticket examiner 9 for an electronic purse may be made without connection.

Fig. 13 shows an example in case wherein electronic money information relating to the sum of a loan is stored in the above-described IC card 1. The reference number 15

denotes a loan information storage. In this case, since personal information, such as the sum of a loan, is stored in an IC card, the security of the electronic money information can be secured.